

THE EFFECT OF PLUGGING STORM PIPE CULVERT ON HEAD I (I)

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Abstract

Plugging storm pipe culvert changes the flow phenomena causing increasing the total head losses which sometimes make the flow to flood over and above the road. The experimental study in this research aims to discuss the effect of the plugging ratio on the total energy head loss. A plugging ratio, $A_r = 50\%$ of the pipe cross section, and a longitudinal plugging length, $L_r = 0\%$, i.e. no plugging as a reference, 25%, 50%, 75%, and 100%. The pipe culvert was tested for five different discharges ($Q = 8.50$ to 38.84 lit. /sec) and three submergence ratios ($Y_2/d = 1.0, 1.5, \text{ and } 2.0$). Dimensional analysis was employed to get the relationships between the different variables affecting the head loss through the plugging culvert. The results of the study led to practical recommendations that may be useful for decision makers to determine the suitable time for maintenance in order to decrease the total energy head losses and reduce road failure. The reduction percentage of the pipe efficiency decreased about 5% at $L_r = 25\%$ for $Y_2/d = 1.0$ and by 14% at $L_r = 100\%$ for average pipe Froude number $F_p = 0.46$ at $Y_2/d = 2.0$.